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Building Back Better Creating a Sustainable Community After Disaster

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It is time for an evolutionary nationwide shift in the approach now being used for coping with natural and technological hazards by universally adopting goals that are broader than local loss reduction; by using a revised framework that links natural hazards to their global context, to environmental sustainability, and to social resiliency; and by modifying hazard mitigation efforts so that they are compatible with that new vision.

Disasters by Design, p. 18

Many hazards specialists in academia, all levels of government, and the private sector have spent much of the last decade promoting hazard mitigation—the permanent reduction of potential losses from natural and/or technological hazards. To a gratifying extent, these efforts have been rewarded. We now have more widespread acceptance—not just among policymakers and specialists, but also to a remarkable degree among the

more general public—that reducing losses before they happen is preferable to cleaning them up over and over again, not to mention avoiding all the disruption and expense they entail. We have at our disposal an extensive array of mitigation techniques, ranging from engineering projects to construction techniques to insurance to forecasting to mapping. To an extent we would not have dreamed of a decade ago, the idea of mitigating

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tion has become intertwined with many public and private initiatives, laws, policies, and programs. There is even funding for mitigation. And yet . . .

Losses due to hazards continue to rise, and our disasters seem to be getting bigger. Indeed, this reality caused many in the field, a few years ago, to consider a mutinous thought: Not all "mitigation" is good.

To be sure, there may be any number of mitigation measures that are ill-conceived or poorly executed—as there inevitably are in any effort. And there are those that begin well but stray from their early vision along the way. But we have begun to realize that even mitigation techniques that are flawlessly designed and executed with the best of intentions and the fondest hopes can, in and of themselves, induce losses elsewhere.

For example, we now have the means to prevent or minimize storm surge damage to a house along the Gulf Coast, by elevating the home above the expected flood level, using certain construction materials and techniques. This combination of mitigation measures is now fairly widespread in both preventing disruption and misery for residents. But is it smart to make it feasible to build a home so close to the ocean? With more of our population converging gradually on the coasts, the potential effects of such mitigation techniques must be considered at a much, much larger scale. Are we simply setting ourselves up for a bigger disaster when a severe hurricane hits?

Or to take another instance, at present most of us would consider it wise mitigation to remove tornado-damaged mobile homes from their original site if that site happened to be a flood-prone area. But what if the mobile home park is the only source of low-income housing in a community? Is that not preventing a flood disaster by creating a financial and housing "disaster" for certain people?

Defining Sustainability

In the late 1980s, the World Commission on Environment and Development (the Brundtland Commission) came up with a definition of global sustainable development that has become widely accepted:

Sustainable development is development "that meets the needs of the present without compromising the ability of future generations to meet their own needs" (1987, p. 188).

It is clear from these examples and many other hypothetical situations that we can no longer afford to consider hazard mitigation in isolation from other aspects of community well-being. A broader context is needed to ensure that the attempts society makes to protect itself from hazards are not simply creating burdens for someone or someplace else, or simply postponing this year's medium-sized disaster in favor of a really big one in the future. The concept of "sustainability" can provide an enlarged framework for examining potential mitigation measures—and any other community concerns—in a wider context.

Principles of Sustainability

The concept of sustainability is based on the premise that people and their communities are made up of social, economic, and environmental systems that are in constant interaction and that must be kept in harmony or balance if the communi-

The Natural Hazards Informer

The *Natural Hazards Informer* is a peer-reviewed series that summarizes current knowledge about various aspects of natural hazards for practitioners, researchers, public policy makers, and others. It is distributed free to all subscribers of the *Natural Hazards Observer*. If you already receive the *Observer*, do nothing. You will automatically receive upcoming issues of the *Informers*.

What This Informer Does

This issue of the *Informers* explains current knowledge about incorporating the principles of sustainability into the disaster recovery process. With minimal tailoring, the strategies described can be transferred to any community to enlighten and inform decisions made in the postdisaster timeframe. This publication suggests effective approaches and offers tips for developing and implementing successful programs. Case studies and examples help to give the discussion some context, and a list of resources suggests places to go for further information.

Who Should Read It and Why

If you are concerned about the vulnerability of a community, county, or state to natural hazards, interested in raising the citizenry's awareness of the issues relating to sustainability and natural hazards, and hopeful that people or their organizations will take steps to enhance sustainability and reduce vulnerability to natural hazards, this *Informers* will give you tools and strategies for effective action. A quick review of what experience and research have taught us about these issues will yield a deeper understanding of what works and what doesn't. Since time, energy, and money are frequently short, we hope to save everyone from wasting resources on ineffective approaches. Emergency managers, local government officials, academic researchers, community activists, and federal and state agencies will find the information helpful as they work to lessen natural hazards risks and create more livable communities.

ty is to continue to function to the benefit of its inhabitants—now and in the future. A healthy, balanced society (or nation, or community, depending on the strength of one's magnifying glass) is one that can endure into the future, providing a decent way of life for all its members—it is a sustainable society. Sustainability is an ideal toward which to strive and against which to weigh proposed actions, plans, expenditures, and decisions. It is a way of looking at a community or a society or a planet in the broadest possible context, in both time and space.

Although it adopts a broad perspective, in practice the pursuit of sustainability is fundamentally a local endeavor because every community has different social, economic, and environmental needs and concerns. And in each community the quality, quantity, importance, and balance of those concerns is unique (and constantly changing). For that reason—and because the best mitigation efforts also tend to be locally based—we tend to speak of sustainability mostly in terms of local actions and decisions.

There are six principles of sustainability that can help a community ensure that its social, economic, and environmental systems are well integrated and will endure. We should remember that, although the list of principles is useful, each of them has the potential to overlap and inter-relate with some or all of the others. A community or society that wants to pursue sustainability will try to:

1. **Maintain and, if possible, enhance, its residents' quality of life.** Quality of life—or “livability”—differs from community to community. It has many components: income, education, health care, housing, employment, legal rights on the one hand; exposure to crime, pollution, disease, disaster, and other risks on the other. One town may be proud of its safe streets, high quality schools, and rural atmosphere, while another thinks that job opportuni-

Salmon, Floods, and Resilience

Coastal development in Tillamook County, Oregon, has been gradually hurting the salmon population—a hallmark of the Pacific Northwest's culture, environment, and economy—as well as increasing the economic costs of seasonal flooding. By drawing on a wider range of information when making planning and development decisions, targeting their funds and expertise to areas of the greatest impact, and carefully coordinating the local, state, and federal agency activities over the past few years, local officials succeeded in dramatically reducing the flood damage in a recent flood. Tillamook County has discovered that what is best for the local environment can also be best for its residents and for the local economy—that is, integrating the sustainability principles of livability, disaster resilience, and environmental quality.

(Livable Communities Initiative, 2000)



ties and its historical heritage are what make it an attractive place to live. Each locality must define and plan for the quality of life it wants and believes it can achieve, for now and for future generations.

2. **Enhance local economic vitality.** A viable local economy is essential to sustainability. This includes job opportunities, sufficient tax base and revenue to support government and the provision of infrastructure and services, and a suitable business climate. A sustainable economy is also diversified, so that it is not easily disrupted by internal or external events or disasters, and such an economy does not simply shift the costs of maintaining its good health onto other regions or onto the oceans or atmosphere. Nor is a sustainable local economy reliant on unlimited population growth, high consumption, or nonrenewable resources.
3. **Promote social and intergenerational equity.** A sustainable community's resources and opportunities are available to everyone, regardless of ethnicity, age, gender, cultural background, religion, or other characteristics. Further, a sustainable community does not deplete its resources, destroy natural systems, or pass along unnecessary hazards to its great-great-grandchildren.
4. **Maintain and, if possible, enhance, the quality of the environment.** A sustainable community sees itself as existing within a physical environment and natural ecosystem and tries to find ways to co-exist with that environment. It does its part by avoiding unnecessary degradation of the air, oceans, fresh water, and other natural systems. It tries to replace detrimental practices with those that allow ecosystems to continuously renew themselves. In some cases, this means simply protecting what is already there by finding ways to redirect human activities and development into less sensitive areas. But a community may need to take action to reclaim, restore, or rehabilitate an already-damaged ecosystem such as a nearby wetland.

- 5. Incorporate disaster resilience and mitigation into its decisions and actions.** A community is resilient in the face of inevitable natural disasters like tornadoes, hurricanes, earthquakes, floods, and drought if it takes steps to ensure that such events cause as little damage as possible, that productivity is only minimally interrupted, and that quality of life remains at (or quickly returns to) high levels. A disaster-resilient community further takes responsibility for the risks it faces and, to the extent possible, is self reliant. That is, it does not anticipate that outside entities (such as federal or state government) can or will mitigate its hazards or pay for its disasters.
- 6. Use a consensus-building, participatory process when making decisions.** Participatory processes are vital to community sustainability. Such a process engages all the people who have a stake in the outcome of the decision being contemplated. It encourages the identification of concerns and issues, promotes the wide generation of ideas for dealing with those concerns, and helps those involved find a way to reach agreement about solutions. It results in the production and dissemination of important, relevant information, fosters a sense of community, produces ideas that may not have been considered otherwise, and engenders a sense of ownership on the part of the community for the final decision.

Sustainability and Disaster Recovery

Applying the principles of sustainability when making decisions can help communities avoid the pitfalls of adopting a course of action without realizing it will have detrimental impacts at another place or time. Ideally, all communities would routinely adopt a long-term view and incorporate sustainability ideals into all aspects of their comprehensive planning process—whether making development decisions, preparing for a disaster, implementing mitigation, or undertaking any other program.

In the absence of this ideal situation, however, a person concerned with avoiding losses due to hazards and disasters must look for opportunities to integrate sustainability with mitigation measures wherever possible. One fertile field for this integration is the disaster recovery period.

A disaster brings temporary changes to a community. People think about problems they normally do not consider—the risks they face from hazards, the quality of local housing, ways in which the community could be better planned and constructed, the local scenic and other natural resources, livability. At the same time, public officials have the media attention that enables them to garner support for innovative ideas. A disaster forces a community to make a seemingly endless series of decisions—some large, some small, some easy, and some quite difficult. Technical and expert advice becomes available from public and private sources. Financial assistance flows into the community, enabling it to tackle more ambitious projects than would normally be the case.

These changes can be viewed as opportunities to rebuild in a better way, instead of succumbing to the natural desire to put things back the way they were as soon as possible. They can provide a chance for a community to implement forward-looking activities that for one reason or another (usually financial or political) have not been undertaken, including improvements in lifestyle, safety, economic opportunity, or the environment. After a disaster, a community must take action to recover, so incorporating principles of sustainability into that process often does not involve much additional effort.

Hazards managers already work to build mitigation into many recovery activities. For example, they often use the Federal Emergency Management Agency's postdisaster programs and other initiatives that in many cases specifically call for mitigation. However, they could go still further, and ensure that the mitigation measures that are put in place promote—or at least do not undermine—sustainable communities.

An Overview of Holistic Recovery

How can a community take advantage of the opportunity that disaster recovery brings? As a foundation for this effort, a framework for sustainable—or “holistic”—recovery from disaster has been developed within which the principles of sustainability become decisionmaking criteria to be applied to each and every recovery decision—not just those that involve mitigation. On the next page is a sample matrix that can be a guide to decisionmaking for holistic recovery. The sustainability principles (and some ways of implementing them) are shown on the vertical axis. Across the top of the matrix are listed some of the problem situations that could confront a community in the aftermath of a disaster: utilities must be restored, infrastructure re-established, housing repaired, social services reinstated, and commercial sectors rehabilitated. At the intersection of the problem and the principle there are opportunities for a recovery decision and action that would be more sustainable than a return to the status quo (marked with an X on the matrix). It should be noted that this matrix is just a sample of a hypothetical disaster in a hypothetical community. A similar matrix developed by a real community to help it in recovery would have a different list of disaster situations across the top, and a different set of boxes marked with X. The principles would be the same as in this sample, as would many of the options for applying them.

This holistic recovery framework can be used either in pre-disaster planning for recovery or during the recovery period itself to ensure that people consider viable, sustainable options as decisions are made. The range of possibilities, alternatives (including returning to the status quo), and impacts of the proposed recovery actions are considered in light of the sustainability principles as decisions are made about recovery, so that sustainable options are considered in each and every disaster recovery opportunity. During this process, a community can tailor a unique set of sustainable activities for its recovery that satisfies its own particular concerns, takes advantage of its strengths, and uses the tools and techniques that are most appropriate to its situation.

Matrix of Opportunities

(x = an opportunity to devise a recovery strategy that furthers sustainability)

Some Situations a Community Could Face during Disaster Recovery

The Principles of Sustainability & Some Options for Applying Them	DAMAGED TRANSPORT	DAMAGED PUBLIC FACILITIES	DAMAGED UTILITIES	DAMAGED HOUSING	ECONOMIC DISRUPTION	ENVIRONMENTAL DAMAGE	DISRUPTION TO HEALTH & SAFETY	OTHER
	Roads, bridges, & related infrastructure	Downtown, CBD, historic district	Power lines	Commercial buildings damaged/destroyed	Riverine, beach, & dune erosion	Medical facilities damaged	Social & family services, daycare disrupted	Other
	Subway, rapid transit	Public spaces	Phone lines	Businesses disrupted	Toxic air, water, soil, wellheads	Victims, population traumatized	Other	Other
1 Maintain & Enhance Quality of Life								
Make housing available/affordable/better		x x x	x x	x x	x x		x x	
Provide education opportunities		x x x			x x		x x	
Ensure mobility	x x	x x x x x		x	x x x x		x	
Provide health & other services		x			x	x x	x x x	
Provide employment opportunities		x			x x x x		x x	
Provide for recreation		x x x x x				x x		
Maintain safe/healthy environs	x x	x x x x	x	x x		x x x	x x x	
Have opportunities for civic engagement		x x x x			x	x x	x	
Others								
2 Enhance Economic Vitality								
Support area redevelopment & revitalization	x	x x x x x	x x x	x x	x x x x	x	x	x
Attract/retain businesses	x x	x x		x	x x x x x			
Attract/retain work force	x	x x		x x	x x	x x x x	x x x x	
Enhance economic functionality	x x	x x x x x	x	x	x		x x	
Develop/redevelop recreational, historic, tourist attractions		x x x			x x	x x x		
Others								
3 Ensure Social & Intergenerational Equity								
Preserve/conserve natural, cultural, historical resources		x x x x x		x x		x x x	x x	x
Adopt a longer-term focus for all planning	x x	x x x x x	x x x	x x	x		x x	
Avoid/remedy disproportionate impacts on groups	x x	x x x		x x	x x x x	x x	x x x	
Consider future generations' quality of life	x x	x x	x x x	x x	x	x x x	x x	
Value diversity		x x x x		x x		x		x x
Preserve social connections in and among groups		x x x		x x	x	x	x x	
Others								
4 Enhance Environmental Quality								
Preserve/conserve/restore natural resources	x x	x x x x x	x	x x		x x x		
Protect open space		x x		x	x	x x x		
Manage stormwater		x x		x	x	x x x		
Prevent/remediate pollution	x	x x x x x	x x x	x x		x		x
Others								
5 Incorporate Disaster Resilience/Mitigation								
Make buildings & infrastructure damage-resistant	x x	x x x x x	x x x	x x	x	x	x x	
Avoid development in hazardous areas	x x	x x x x x	x x x	x x	x	x x	x x	
Manage stormwater		x x		x	x	x x x		
Protect natural areas	x	x x x		x	x	x x	x x	
Promote & obtain hazard & other insurance	x	x x		x x x	x x x		x x	
Others								
6 Use a Participatory Process	Use a participatory process in conjunction with all the other principles of sustainability, and in every disaster recovery situation in which it is appropriate.							

This process can result in some unusual combinations of problems and solutions. For example, a stricken community with a damaged freeway overpass might well decide to incorporate seismic-resistant features into the repaired structure. However, a community striving for holistic recovery would also consider demolishing or relocating the overpass to enhance livability in the surrounding neighborhood (principle number 5), or rebuilding it to improve access to, and thus economic vitality for, a nearby commercial area that was previously difficult to reach from the highway (principle number 2). This is just one of many possible outcomes of a systematic process of analyzing recovery in light of the six sustainability principles. The possibilities are endless, because each community has unique attributes, needs, and concerns, and each disaster superimposes a distinct set of impacts.

What is Holistic Recovery?

Definition: A holistic recovery from a disaster is one in which the stricken locality systematically considers each of the principles of sustainability in every decision it makes about reconstruction and redevelopment.

This can be more appealing to a community than simply trying to impose mitigation measures, even with financial and other incentives, because it gives the members of a community a way to examine their other day-to-day goals within a broader context. Mitigation doesn't drive the process—community goals, buttressed by sustainability ideals, do. But mitigation gets considered in every decision about economic development, infrastructure repair, housing needs, and environmental protection. By the same process, concerns about economic development, local environmental quality, social equity, future generations, and other aspects of a healthy community are considered in every decision about mitigation.

The Process

The best way to ensure community sustainability after a future disaster is to have a thorough plan for a holistic recovery.¹ But even without such a plan, there are many things that can be done during recovery that will increase community sustainability, simply by using the holistic recovery framework as a guide and the disaster recovery process as the catalyst. A community must strive to fully coordinate available assistance and funding while seeking ways to accomplish other commu-

1. An excellent guide for preparing a comprehensive recovery plan before a disaster strikes is *Planning for Post-Disaster Recovery and Reconstruction*, by Schwab, et al., listed in the "References and Information Resources" section on page 10.

The Red River of the North

After the disastrous 1997 floods on the Red River of the North, thousands of households in the Greater Grand Forks area had damage serious enough to necessitate the replacement of their furnaces and/or hot water heaters. The recovery decisionmakers realized that this was a chance to effect a massive upgrade of the heating systems in the area. Rebates of \$200 were offered to each homeowner and small business owner who replaced his or her damaged furnace or water heater with an energy-efficient unit. About 5,500 households and businesses (about half of those flooded) took advantage of the rebates. These new furnaces consume less fuel and give off fewer pollutants, improving quality of life in the Red River Basin.

(International Red River Basin Task Force, 1999)

nity goals and priorities. Holistic disaster recovery does not differ from "normal" disaster recovery—it is part of what should be normal disaster recovery. A good recovery engenders a sustainable community.

A community does not need a new or separate planning or recovery process to build sustainability. The sustainability perspective can be accommodated in different ways and to varying degrees within most standard procedures used by localities for comprehensive planning, mitigation planning, disaster recovery, or other efforts.

A good, all-purpose planning process—the so-called 10-Step Planning Process—is one that is recommended for localities seeking funding, technical assistance, or recognition under such federal programs as the Community Rating System of the National Flood Insurance Program, several flood control programs of the U.S. Army Corps of Engineers, and the Hazard Mitigation Grant Program and the Flood Mitigation Assistance Program administered by the Federal Emergency Management Agency. It follows the basic procedures of gathering information, analyzing problems, setting goals, and finding ways to implement and fund agreed-upon activities. The section beginning on the next page shows one way in which the principles of sustainability could be incorporated into that process after a disaster.² As always, a community needs to tailor this procedure to meet its own needs.

2. More detail on how sustainability can be addressed during disaster recovery can be found in *Holistic Disaster Recovery: Ideas for Building Local Sustainability after a Natural Disaster*, by the Natural Hazards Research and Applications Information Center. The 10-Step Process is described in more detail, with an eye toward minimizing flood damage, in *Flood Mitigation Planning: The CRS Approach* by French Wetmore and Gil Jamieson. Both of these publications are in the "References and Information Resources" section on page 10.

A 10-Step Process for Local Holistic Recovery

- 1. Get organized.** At this stage a community makes a commitment to sustainability by designating appropriate responsibility for the recovery, delegating it to an individual or entity—new or existing—and setting up measures for integrating sustainability into ongoing disaster recovery and other community processes, as necessary. One way to do this would be to appoint a “sustainability liaison” to the planning and decisionmaking body or the recovery team. The person in this role would be an advocate for considering the principles of sustainability at each step of the process as well as knowledgeable about and supportive of all those principles: environment, social equity, consideration of the future, economic development, quality of life, and disaster resilience.
- 2. Involve the public.** Participatory processes are an essential aspect of sustainability involving the inclusion of all the stakeholders in recovery and in creating the vision of what the community should be like after the recovery is complete. A community that seeks sustainability must be committed to such involvement and, at this point, the community begins to design public participation into all phases of its recovery. There are many techniques from which to choose, from the traditional public hearings and town meetings to lectures, planning charettes, workshops, call-in radio shows, and community-based events like fairs and festivals. To fulfill the goal of social equity, communities should pay particular attention to reaching out to those people who may have been historically excluded from conventional “public notice” techniques because of language differences, cultural constraints, temporal or spatial barriers to attending meetings, or other factors. The opportunities for participation should be publicized through a variety of media, including flyers, posters, local newspapers, local television stations, and the Internet.
- 3. Coordinate with other agencies, departments, and groups.** To mastermind a holistic recovery, a community must expand representation on the recovery team to include those who can contribute expertise regarding each of the principles of sustainability. They could be in-house staffers, local experts, representatives from state or federal agencies, or consultants. Depending on the situation, social services personnel, environmental specialists, engineers, economic development directors, parks or wildlife department personnel, the business community, or social services personnel all might be included. Formal and informal ties need to be developed with every conceivable private entity; non-profit group; neighborhood coalition; church; state, local, federal, and regional agency; and others. This will increase the diversity of ideas and potential solutions, provide a ready-made labor pool (which will be needed when implementation begins), and make problem-

solving more imaginative. It also will strengthen local capacity within and across groups and areas of expertise.

- 4. Identify post-disaster problems.** During this step, the recovery team begins to systematically consider ways in which it can build sustainability as it plans for and manages the recovery. The team can start by simply listing all the disaster-caused situations that need to be remedied in the course of recovery. (Some possibilities are listed across the top of the matrix.)

For each problem situation, information should be gathered to gain a full picture. This is a broad exercise that likely will include many sub-steps spread over a wide array of issues, for example:

- Obtaining expert analysis of local economic trends, costs of rebuilding, and opportunities for economic growth, before and after the disaster;
- Mapping an environmentally sensitive area;
- Assessing the community’s present and future vulnerability to hazards and disasters;
- Pinpointing social inequity and its impacts within the community, before and after the disaster;
- Determining what quality of life concerns are important to local residents, before and after the disaster.

Obviously it is preferable to have this information in hand before a disaster, rather than having to gather it afterward, when the situation is confused, and time and resources are at a premium. This step will culminate in a list of problem situations, accompanied by supporting information.

- 5. Evaluate the problems and identify opportunities.** The implications of sustainability become clear during this step. The recovery team evaluates each of the problems identified in Step 4 in light of the six principles of sustainability to see where there are opportunities during recovery to enhance community sustainability and move toward the community’s vision of its future rather than returning to the status quo. The list of options in the box (and listed on the left side of the matrix) can be used to stimulate thinking about sustainable approaches a locality can use to address each postdisaster problem. One or more approaches should be designated as possibilities for each problem, focusing on those that are applicable to the community’s situation, needs, and concerns. Note that this is not an exhaustive list and also that some options apply to more than one principle.

This step results in a list of possible ways to combine remedying a disaster-caused problem and addressing an “unsustainable” situation. Each idea represents a way to further one or more aspects of sustainability, without regard (at this point) to cost or feasibility. The list is sim-

ply a series of specific things that, ideally, the community would like to do. For example, suppose the community has experienced a flood that, among other impacts, has seriously damaged a neighborhood of low-income houses along a polluted stream. One item identified during this step might be: "Expand stormwater management system to better handle street drainage and reduce streambank ero-

Principles of Sustainability and Some Options for Applying Them

1. Maintain and enhance quality of life

Options: Make housing available/affordable/better
Provide education opportunities
Ensure mobility
Provide health and other services
Provide employment opportunities
Provide for recreation
Maintain safe/healthy environs
Have opportunities for civic engagement

2. Enhance Economic vitality

Options: Support area redevelopment and revitalization
Attract/retain businesses
Attract/retain work force
Rebuild for economic functionality
Develop/redevelop recreational, historic, tourist attractions

3. Ensure social and intergenerational equity

Options: Preserve/conserve natural, cultures, historical resources
Adopt a longer-term focus for all planning
Avoid/remedy disproportionate impacts on groups
Consider future generations' quality of life
Value diversity
Preserve social connections in and among groups

4. Enhance environmental quality

Preserve/conserve/restore natural resources
Protect open space
Manage stormwater
Prevent/remediate pollution

5. Incorporate disaster resilience/mitigation

Options: Make buildings and infrastructure damage-resistant
Avoid development in hazardous areas
Manage stormwater
Protect natural areas
Promote and obtain hazard and other insurance

6. Use a participatory process

Option: Incorporate with all of the other principles

sion" (thereby repairing flood-damaged infrastructure, improving livability by reducing street flooding, minimizing future flood damage by enlarging the carrying capacity of the stormwater system, and improving environmental quality by preserving soil and riparian vegetation from erosion). Another item might be: "Incorporate seismic-resistant features and insulation into damaged housing during repair" (thereby improving livability by making the houses warmer and cooler according to the time of year and less expensive to heat or cool, improving disaster resilience by strengthening the housing against earthquakes, and protecting environmental quality by reducing energy consumption). The team tries to consolidate multiple sustainability principles into each possibility it lists.

6. Set goals. During this step the recovery team agrees on what realistically can be done. The team pares down the list of possibilities identified in Step 5 to those measures preferred by most of the stakeholders and most consonant with local needs and situations, public support, cost-effectiveness, availability of technical expertise, other community goals, local regulations, and other factors. A range of possibilities is developed and prioritized in case some cannot be implemented. These final choices become the recovery goals—positive statements of what the community intends to accomplish. By this point it will become clear that the goals established for a holistic recovery are broader and have more far-reaching implications than those for simply returning to the status quo.

This step will result in an agreed-upon set of actions that have reasonable applicability to the community. (It should be noted that in practice, Steps 4, 5, and 6 likely will overlap.)

7. Develop strategies for implementation. Working with the list of goals developed in Step 6, the recovery team reviews the tools, financial support, and expertise available to achieve each of them. For each goal, an implementation strategy is developed that describes

- What is to be accomplished;
- The lead agency/entity and what it will provide or prepare;
- Partnerships that will enhance effectiveness;
- Ways to obtain technical expertise and advice;
- Official local action needed (passage or amendment of zoning or subdivision ordinances, adoption of building codes, etc.); and
- Funding methods.

This will produce a "package" associated with each community goal that outlines what is needed to achieve that goal. This step weeds out the possibilities that are not feasible for whatever reason and results in a set of strategies that realistically can be implemented.

8. Plan for action. During this step the recovery team drafts a complete plan for holistic recovery activities that fits into the recovery plan or becomes part of the community's comprehensive plan. Like other plans, it should include

- a budget;
- details for obtaining funding;
- a schedule for team meetings, public participation, data collection, report writing, on-the-ground action;
- a monitoring and review process; and
- provision for public review and comment.

This plan should be coordinated with existing comprehensive, development, capital improvement, drainage, transportation, housing, and recreation plans and programs. After public and agency/entity review, the plan should be revised and finalized.

9. Get agreement on the plan for action. Depending on the circumstances, the state, county, and/or local government may formally adopt or approve a holistic recovery plan or otherwise officially incorporate it into the recovery or comprehensive plan. During this stage, the local community should obtain agreement from federal and state agencies as appropriate. It might also enter into memoranda of understanding with other partners. The agreement of other stakeholders, especially historically excluded groups, should be obtained.

10. Implement, evaluate, and revise. This final step ensures that the community maximizes the opportunities that began as a disaster. Having the persons and entities responsible for implementation of various aspects of the recovery actually involved in the decisionmaking during all the earlier steps helps ensure that the goals and activities agreed upon are actually carried out.

As recovery proceeds, it will be clear that some goals and strategies need to be modified. A formal monitoring process helps identify what changes are needed. It also can help keep certain initiatives from simply being abandoned when an unforeseen obstacle is reached. Wherever possible, stakeholders should participate in reviews (at least annually) and help develop indicators of progress.

A Long-Term Outlook

Sustainable practices (and the awareness of the principles of sustainability) introduced during recovery planning or actual recovery can be institutionalized within the community's decision-making, budgeting, and planning processes to ensure that they endure over time. Ideally, a community would develop indicators and a schedule for monitoring and tracking change and needed improvements. Such institutionalization would help build awareness of the many aspects of sustainability as local residents, public officials, city staff, and businesses come and go. The heightened awareness would in turn nurture an acceptance of sustainable practices as a local, public value and a way of life.

Using the holistic recovery framework, applying the sustainability principles, and employing a process like the 10-step procedure create additional benefits for a community. For one thing, they promote links, conceptual and operational, among different community interests and the groups that seek to further them. For example, how many times have people discovered—inadvertently—that those responsible for local parks and recreation actually are interested in the same sort of open space

Some Tools for Community Sustainability

- Local redevelopment authority
- Economic incentives
- Loans for businesses
- Housing authority
- Insurance
- Capital improvements
- Low interest subsidy loans
- Revolving loan funds
- Public investment
- Redistricting
- Subdivision regulations
- Building codes
- Special ordinances
- Tax incentives
- Transfer of development rights
- Easements
- Land purchase
- Voluntary agreements
- Planning
- Habitat protection
- Riparian buffers
- Filter strips and vegetative buffers
- Soil conservation and management
- Ecosystem restoration
- Zoning and rezoning
- Public education and awareness campaigns and events
- Special protection of critical facilities, utilities, and networks
- Preserve and create public spaces
- Limit public investment in hazardous areas
- Relocation out of hazardous areas
- Preservation of natural floodplain, coastal, wetland, and other functions
- Private-public partnerships and networks
- Ombudspersons
- Targeted workshops
- Community festivals and other activities

improvements that the wildlife advocates want? This process makes such serendipitous convergence more likely and helps solidify future collaboration, thus making it easier and more cost-effective for the community to accomplish its overall goals and carry out routine activities.

Another benefit to hazards managers is that drawing on the broad range of sustainability principles instead of just thinking about hazards in isolation makes it more likely that the hazard mitigation approaches that are adopted and carried out will actually minimize losses in the long run. It helps ensure that the mitigation measure(s) implemented will be valuable because they are paired with other community desires, and long-lasting, because they do not detract from other aspects of overall sustainability. Losses will not have to be borne, damage repaired, and victims compensated again and again in future disasters.

Conclusion

Throughout the nation, local community, county, state, and federal agencies have become accustomed to thinking in terms of "building in" hazards mitigation during many recovery activities. This movement has been helped by the advent of

federal disaster programs and policies that provide legal, technical, and financial support for taking these sensible, long-term, cost-saving measures. As a next step in this evolution, we can begin to incorporate sustainability as another element within disaster recovery, and reap even broader and longer-term benefits.

Besides advancing ideals that improve the livability and appeal of a community, this holistic recovery approach can also help local residents to think and rethink their community goals and ponder the kind of place they want their grandchildren to inherit. It can encourage each locality to carefully balance risk vs. protection, cost vs. benefit, today vs. tomorrow.

The holistic recovery framework described here does not guarantee that every sustainability principle will actually be included in disaster recovery, but it does ensure that they will at least be considered. Holistic recovery is a sensible approach to recovering from a disaster. It helps a community work toward fully coordinating available recovery assistance and funding with measures to accomplish broader community goals and priorities. At the same time, it widens the goals of the recovery to encompass many aspects of a community that may not have been considered before.

References and Information Sources

The sources of information listed below are just a few of the many resources on sustainability and recovery listed in the Natural Hazards Center's publication, *Holistic Disaster Recovery* (see below). That document can be accessed on the Center's website at www.colorado.edu/hazards.

Association of State Floodplain Managers, Inc. (ASFPM)

1996 *Using Multi-Objective Management to Reduce Flood Losses in Your Watershed*. Madison, Wisconsin: ASFPM. Abstract available at www.floods.org/PDF%20files/PUBLIST.pdf.

Burby, Raymond J., ed.

1998 *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*. Washington, D.C.: The Joseph Henry Press. Available at www.nap.edu/catalog/5785.html.

Federal Emergency Management Agency (FEMA)

2000 *Planning for a Sustainable Future: The Link Between Hazard Mitigation and Livability*. FEMA Report 364. Washington, D.C.: FEMA. Available at www.fema.gov/mit/planning_toc.htm.

Federal Emergency Management Agency (FEMA)

2000 *Rebuilding for a More Sustainable Future: An Operational Framework*. FEMA Report 365. Washington, D.C.: FEMA. Available at www.fema.gov/mit/planning_toc2.htm.

Fothergill, Alice, Enrique G.M. Maestas, and JoAnne Darlington DeRouen

1999 "Race, Ethnicity and Disasters in the United States: A Review of the Literature." *Disasters* 23(2):156-173.

Hart, Maureen

1999 *Guide to Sustainable Community Indicators*. Second edition. North Andover, Massachusetts: Hart Environmental Data. See the website, which contains links and contact information for sources of assistance and advice, along with a list of communities in the United States that are developing indicators of sustainability: www.sustainablemeasures.com.

Institute for Business and Home Safety (IBHS)

2001 *Making Communities Safer*. Annual Report. Tampa, Florida: IBHS. This and related publications and information are available at www.ibhs.org.

International Red River Basin Task Force

1999 *An Assessment of Recovery Assistance Provided after the 1997 Floods in the Red River Basin: Impacts on Basin-wide Resilience*. Report prepared by the Natural Hazards Research Center, University of Colorado and the Disaster Research Institute, University of Manitoba for the International Joint Commission's Red River Basin Task Force. Ottawa, Ontario, Canada: International Joint Commission. Available at www.ijc.org/boards/rb/Recovery%20Assistance.pdf.

Livable Communities Initiative

2000 *Building Livable Communities: Sustaining Prosperity, Improving Quality of Life, Building a Sense of Community*. Washington, D.C.: U.S. Government Printing Office.

The Informer

Mileti, Dennis S.

1999 *Disasters by Design*. Washington, D.C.: The Joseph Henry Press. Available at books.nap.edu/catalog/5782.html.

Natural Hazards Research and Applications Information Center

2001 *Holistic Disaster Recovery: Ideas for Building Local Sustainability after a Natural Disaster*. Boulder, Colorado: Natural Hazards Research and Applications Information Center. Available at www.colorado.edu/hazards.

Schwab, Jim; Kenneth C. Topping, Charles C. Eadie; Robert E. Deyle; and Richard A. Smith

1998 *Planning for Post-Disaster Recovery and Reconstruction*. PAS Report No. 483/484. Chicago, Illinois: American Planning Association. Abstract available at www.planning.org/apapubs/details.asp?Num=1178.

Wetmore, French and Gil Jamieson

1999 "Flood Mitigation Planning: The CRS Approach." *Natural Hazards Informer* 1. Boulder, Colorado: Natural Hazards Research and Applications Information Center. Available at www.colorado.edu/hazards/informer/index.htm.

World Commission on Environment and Development

1987 *Our Common Future*. New York: Oxford University Press. Abstract available at www.oup.co.uk/isbn/0-19-282080-X#desc.



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Among the many people who supplied ideas and experiences to the holistic recovery framework were the contributing authors to the Natural Hazards Center's guidebook, *Holistic Disaster Recovery*, also produced under that project. They were Charles Eadie, Rod Emmer, Ann-Margaret Esnard, Sarah Michaels, Jacquelyn Monday, Clancy Phillipsborn, Brenda Phillips, and David Salvesen. Copies can be downloaded from the Natural Hazards Center's web site: www.colorado.edu/hazards.

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Please take a moment to provide us with some feedback about this *Informer* and the ideas it presents about holistic disaster recovery. Mail or fax this page to the address on the next page.

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